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ABSTRACT

The adequacy of pension plans for persons retiring from colleges and universities is considered. Data are presented showing that people who retired in the late 1960s and early 1970s from higher education institutions at ages 65 and 68 spent most of their working lives earning less than $10,000 a year. The phenomenon of low pensions in an age of rapid inflation for a group of retirees at a liberal arts college is illustrated. The examples are based on a Teachers Insurance Annuity Association/College Retirement Equity Fund (TIAA/CREF) defined contribution plan where the level of employee/employer contributions plus TIAA/CREF investment performance define the outcome. Length of service has little or nothing to do with the size of the pensions, but the person's age does correlate well with pension size, and a person's sex, rank, and specialty also have an influence. In addition to pension plan income plus social security benefits, each employee has some responsibility for voluntary savings toward retirement. Based on investigations of a group of retirees, it is concluded that the CREF annuity unit decreases have worked serious economic hardships on more than half the study sample. However, it is suggested that by focusing on the annuity unit value, one ignores the fact that the reinvestment of dividends bought additional accumulation units. Approaches to protect annuitants against inflation are proposed, and it is recommended that CREF report to its participants the quantity of accumulation units purchased monthly and the number of shares purchased through dividend reinvestment. (SW)

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CAN ANYONE AFFORD TO RETIRE IN AN AGE OF INFLATION?

by

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The Association For Institutional Research
Forum, 1981

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

This paper was presented at the Twenty-First Annual Forum of the Association for Institutional Research held at the Leamington Hotel in Minneapolis, Minnesota, May 17-20, 1981. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum Papers.

Mary Corcoran
University of Minnesota
(Editor, AIR Forum Publications)

1. It is Commencement time in the year 1970. You have but a few more moments of relative privacy before the President of the college for which you have worked will announce your retirement. Now that the hour of the official announcement is almost here, you have difficulty concentrating on what is happening up front.

You try to guess some of the things your President will mention. He will surely refer to the fact that you were the first woman hired by the college and by your department. Your thought is that he will get some undeserved "affirmative action" mileage from this reference. He will probably also tell the audience that you are the only member of the staff in the history of the college who has served with distinction for 47 years. You even expect him to mention your good health, since you never had more than a very rare case of the flu.

And, of course, he will mention some of your publications and professional awards. You like to recall the day when your own alma mater conferred its honorary degree. And you think back with pride when a textbook you wrote became a modest best-seller, at least for a few years. Today it is no longer in use, what with Latin being an endangered species. This morning you recall with special pleasure the scrapbook presented to you by your former students with more than 500 letters and signatures. Forty-seven years, you muse, what a long time at one institution, and how quickly it went by.

While you are waiting for the call from the rostrum, some other thoughts intrude. You try to banish them, deeming them inappropriate to such a solemn day; but they persist. This very morning you stopped once more at the bursar's office for some last-minute advice on how to arrange certain financial matters. You recall the treasurer's dismay when you

showed him what your retirement income would be. "Are you sure that you can live on this?" he had asked. "I have some savings," you said. But you did want him to double-check about the pension: "They did not make a mistake, did they?" you inquired. "No," he said in an undertaker-sympathetic modulation; "it is the correct amount, we checked it out with TIAA."

The figure was $2,425. It still seems a bit small, you think, but you have always coped before. Now they are calling your name, and it is time to attend to the business of the day.

2. In discussions of retirement income and plans it is sometimes useful to look back and ask what has happened to persons who retired from higher education within the last decade or so. If one is charged with designing adequate pension plans for future retirees, what can be learned from the past? Although we do not know how the economy will shape itself tomorrow, it is not unreasonable to ask what might be in store if the past were indeed prologue to the future.

The first striking discovery is surely that persons who retired from our colleges and universities during the late 1960s and early 1970s at previously normal or mandatory retirement ages of, say, 65 and 68, spent most of their working lives earning less than $10,000 a year.

Chart 1 illustrates the phenomenon. With 45 years of service in higher education, using AAUP and TIAA supplied data on average salaries, you would have had to start working in 1933 or 1934 in order to receive a salary in excess of $10,000 per year during 50 percent or more of your working life. If your service extended over 35 years, your employment would have had to start in 1940 to this same end.

Chart 1

Percent of working years when salary exceeded $10,000 at case-study college.

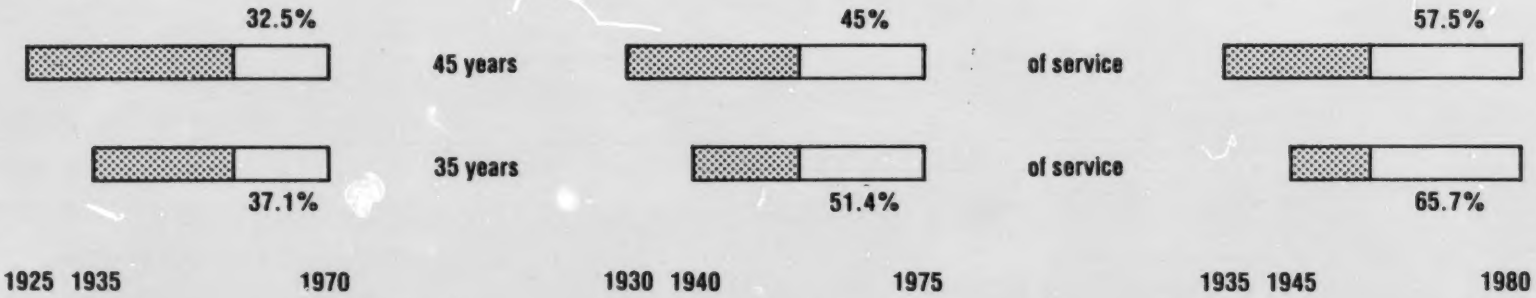


Table A illustrates the same phenomenon for an hypothetical institution and two individuals. It focuses on lifetime income from salaries in higher education. The distinction is both striking and fundamental.

Employee A began work in 1925 at an annual salary of $1,888, and retired in 1970 at a salary of $17,374. Lifetime income amounted to $283,321. Employee B started at the same institution in 1938 at $1,892 after a salary decrease had been instituted for new hires because of lagging enrollments. He retired in 1978 at a salary of $25,079. His lifetime earnings came to $407,194. Thus the table illustrates one important effect of inflation: because of escalating salaries after 1960, employee B has a larger retirement capital at his disposal after 41 years of service than employee A after 46 years of service.

When we look into the future, these illustrations can be useful. Many currently employed younger persons are seeing prospects of rather high future retirement capital accumulations and income. Recent rates of salary inflation will provide employees with very rapidly increasing lifetime earnings. It is not at all a foregone conclusion that retirement incomes will be adequate, though they will be high, if high rates of price inflation persist.

The illustrations on Table A do not include the interest and dividend income compounding which is part of every lifetime retirement capital accumulation. But the illustrations do point to the employer-employee lifetime contribution under a plan requiring a total 10 per cent payment each month. Thus prior to any compounding effect, employee A will have accumulated an initial capital of $28,332; and employee B will have built up a sum of $40,719. If all other things were equal,

TABLE A

HYPOTHETICAL LIFETIME INCOME ESTIMATES, 1925 - 1970 and 1938 - 1978

	A - Female					B - Male			
Yr.	Instr.	Assist. Prof.	Assoc. Prof.	Prof.	Yr.	Instr.	Assist. Prof.	Assoc. Prof.	Prof.
'25	1,888				38	1,892			
	1,906					1,914			
	1,924				40	1,937			
	1,924					1,937			
	1,952					1,937			
'30	2,003				43	1,937			
	2,030				44	11,554	2,900		
	2,069				45		3,100		
	2,069						3,300		
	2,069						3,500		
'35	19,834	2,449					3,800		
		2,486			49		3,942		
		2,556			50		20,542	4,930	
		2,592						5,227	
		2,598						5,524	
'40		2,605						5,600	
		2,625						5,712	
'42		2,645			55			5,883	
'43		20,556	3,400					6,059	
			3,600					6,423	
'45			3,800					6,759	
			4,050		59			7,095	
			4,300		60			59,212	9,731
			4,600						10,344
			4,765						10,858
'50			4,930						11,399
			5,227						12,017
'52			5,524		65				12,715
'53			44,196	7,000					13,505
				7,140					14,402
'55				7,354					15,341
				7,575					16,312
				8,025	70				17,374
				8,557					18,314
				9,086					18,913
'60				9,731					19,751
				10,344					20,798
				10,858	75				21,870
				11,399					23,233
				12,017					23,930
'65				12,715	78				25,079
				13,505					315,886
				14,402					
				15,341					
				16,312					
'70				17,374					
				198,735					

Lifetime Income

A - Instr.	19,834		
Assist Prof.	20,556		
Assoc. Prof.	44,196		
Prof.	198,735		
	283,321		
10%	28,332	10 years over	
46 years of service		10,000	
Avg. per year	6,159		
10%	615.90		
B - Instr.	11,554		
Assist Prof.	20,542		
Assoc. Prof.	59,212		
Prof.	315,886		
	407,194		
10%	40,719	18 years over	
41 years of service		10,000	
Avg. per year	9,932		
10%	993.20	5 years over	
		20,000	

TIAA Accumulation at Retirement

A = $36,576.58

B = $76,565.74

the retirement income of employee B would probably be at least 43 percent larger than that of employee A. Of course, other things are not equal, except the fact that both persons live today in the same world and experience the same double-digit impact of inflation.

Accelerating rates of inflation of recent years (see Tables D and E, below) are exacerbating the differential growth of retirement capital accumulations and thus the resulting retirement income differences. One obvious source of discrepancies in retirement incomes within a given plan is the fact that some employees save a larger portion of their current income than others. But when one studies lifetime earnings, by far the most significant reason for such differences is the acceleration in the rate of inflation and the resulting escalation of salaries and wages.

Table A demonstrates the problem rather nicely. For employee B salaries were below the $10,000 level during 23 years of his service. It took another 14 years for the escalation to reach $20,000. It will take less than 10 years to reach the $30,000 level, and this during a period when faculty salaries are increasing less rapidly than the general rate of inflation! Unless the general rate of inflation can be brought back below the current double-digit pace, there is only one reason why such an acceleration will not continue into the future: the persistence of a decline of the higher education industry that brings with it slower salary growth. Should this happen, the outcome would be generally lower than desirable retirement capital accumulations and eventually depressed annuity incomes.

Table B illustrates the phenomenon of low pensions in an age of rapid inflation for a group of retirees at a well-known liberal arts college.

TABLE B

Selected TIAA/CREF Pensions (case study college) as Reported by Recipients

Age 1981	Years of Service	12/31/76	12/31/79
79	47	2,544	2,562
77	46	4,260	4,319
90	45	1,836	1,835
85	45	1,584	1,587
93	42	1,764	2,053
84	42	4,776	5,880
90	40	-o-	-o-
78	40	3,060	3,064
76	40	5,040	5,192
88	39	2,088	2,085
74	39	5,796	5,712
77	38	3,024	3,046
75	38	4,656	4,741
87	37	3,215	3,215
94	37	1,953	1,953
76	36	2,364	2,399
77	28	2,580	2,962

Note: Inflation Estimate: CPI 1976 170.5 } 9.2% per year
1979 217.7 }

Every person in the group retired between 1960 and 1975. The data have not been adjusted for probable voluntary contributions by the employees in excess of those required as a minimum by the basic pension plan. Nor is the TIAA/CREF mix identified. Such refinements would be helpful for an in-depth analysis of these retirement incomes. But since no one receives even $6,000 per year, we are spared the need to be thorough in the face of such appallingly low pensions.

In public service employee and some industrial pension plans, retirement income is in part a function of one's length of service. Such plans tend to have a "defined benefit" which is normally expressed as a percentage of some salary (or salary average) earned during the last year (or years) of service multiplied by some factor that takes into account the number of years of service. In addition, many if not most public service employee pension plans sport an escalator clause of some sort, indexing the annuity to some percentage if not to all of inflation.

The illustrations in Table B are based on a TIAA/CREF "defined contribution" plan where the level of employee/employer contributions plus TIAA/CREF investment performance define the outcome. Upon retirement actuarial considerations also enter the picture. As can be seen plainly, length of service has little or nothing to do with the size of the pensions received by the respondents represented in the table.

On the other hand, there is a fairly good correlation between the size of the pension and each person's age. If voluntary contributions had been isolated, the fit would be even better. Our data confirm this tendency for the entire group of more than 30 retirees of which the table represents a sub-group.

In a "defined contribution" plan of the TIAA/CREF type, lifetime salary inflation (or growth, as some prefer to call it) is indeed a primary determinant of pension differentials for persons of differing ages. Other factors have an influence also, such as a person's sex, rank, and professional specialty. Also important is the type of institution for which one worked. But these factors appear to be more important in explaining pension differentials for persons of the same age.

4. In passing it may be of some interest to focus on Table C which summarizes the total pension and social security retirement income situation for a slightly expanded group of retirees at the same institution. The data are for the 1979-80 pay period.

Column (11) lists the percentage represented by the TIAA/CREF pension of the salary average during the last five years of full-time employment. All but one case is in the 40-percentile (47.3) rank; two are below 20 percent; 10 range through the 20 percentile rank; and the remaining eight are distributed throughout the 30 percentile rank. Thus, overall, these are rather small weights.

The writer recalls a violent debate on the question of whether or not the institution should begin to participate in the social security program. Without social security the list of retirees shown in Table C would no doubt face dire economic hardships. Although some of the older persons may no longer be in need of large cash incomes, the list clearly shows why our older population so often turns up among the poverty statistics.

Institutions might be well advised to study the pension and social security condition of their already retired employees. If they

TABLE C

Salaries Persons Retired Prior to September 1, 1975

1979-80 Retirement Income

Sex	(1) Years of Service	(2) Present Age	(3) Sal. Avg. Cost 5 Years	(4) TIAA/CREF or Equiv. 11/1/79	(5) Social Security 11/1/79	(6) Total Col. 4 + Col. 5	(7) Col. 6 As % of Col. 3	(8) College Supplement	(9) Total Col. 6 + Col. 8	(10) Col. 9 As % of Col. 3	(11) Col. 4 As % of Col. 3	(12) Col. 4 + Col. 8 As % of Col. 3
Fs	47	79	13,280	2,562	5,707	8,269	62.3%	2,654	10,923	82.3%	19.3%	39.3%
Fs	46	77	15,320	4,319	5,554	9,873	64.4%	2,127	12,000	78.3%	28.2%	42.1%
Md	45	90	6,620	1,833	4,081	5,914	89.3%	136	6,050	91.4%	27.7%	29.7%
Md	45	85	9,380	1,587	4,327	5,914	63.0%	1,472	7,386	78.7%	16.9%	32.6%
Ms	42	93	8,640	2,053	5,077	7,130	82.5%	-o-	7,130	82.5%	23.8%	
Fs	42	84	12,420	5,880	4,508	10,388	83.6%	-o-	10,388	83.6%	47.3%	
Md	40	90	8,680	2,049	4,327	6,376	73.5%	-o-	6,376	73.5%	23.6%	
Mm	40	76	16,860	5,192	4,970	10,162	60.3%	1,639	11,801	70.0%	30.8%	40.5%
Fs	40	78	13,520	3,064	5,777	8,841	65.4%	1,023	9,864	73.0%	22.7%	30.2%
Md	39	88	6,600	2,085	4,255	6,340	96.1%	-o-	6,340	96.1%	31.6%	
Mm	39	74	15,560	5,712	6,449	12,161	78.2%	-o-	12,161	78.2%	36.7%	
Fs	38	77	10,160	3,046	5,366	8,412	82.8%	-o-	8,412	82.8%	30.0%	
Mm	38	75	16,000	4,741	6,252	10,993	68.7%	-o-	10,993	68.7%	29.6%	
Md	37	87	8,855	3,215	4,327	7,542	85.2%	-o-	7,542	85.2%	36.3%	
Fs	37	94	5,040	1,953	3,698	5,651	112.1%	399	6,050	120.0%	38.8%	46.7%
Fs	36	76	10,060	2,399	5,134	7,533	74.9%	-o-	7,533	74.9%	23.8%	
ERT Mm	36	71	16,500	5,569	6,842	12,411	75.2%	1,419	13,830	83.8%	33.8%	42.4%
ERT Mm	33	76	16,000	4,693	6,450	11,143	69.6%	-o-	11,143	69.6%	29.3%	
Mm	29	73	18,460	5,545	5,524	11,069	60.0%	-o-	11,069	60.0%	30.0%	
Mm	29	71	19,000	3,879	5,734	9,613	50.6%	30	9,643	50.8%	20.4%	20.6%
Fs	28	77	12,400	2,926	5,030	7,956	64.2%	-o-	7,956	64.2%	23.6%	

M = Male
F = Female
s = Single
d = Spouse Deceased
m = Married
ERT = Early Retirement

have not done so already, they may be in for some unpleasant surprises. If the pension plans of the past produced inferior results, how certain are we that existing programs will do better tomorrow? After talking with numerous individuals who formerly worked in the private liberal arts sector of higher education, we suspect that the full story of economic distress has not yet been told. We might learn from an appropriate study how to design appropriate retirement programs that are more suitable in an age of inflation than our basic programs of the past appear to have been.

A case in point is the discussion among retirees and elsewhere on the appropriateness of the CREF retirement plan. In the remaining sections of this essay, we shall touch on but a few aspects of the CREF experience, and we shall make a few modest initial recommendations for a review of certain aspects of the program.

5. Retirement income issues are complex and not easily reduced to broad generalizations. Each person is affected by unique economic or financial circumstances which determine both sources and scope of the total retirement income stream.

A common segment of the total retirement income available to a person is the combination of pension plan income plus social security benefits (where they apply). And pension plan income can stem from one's voluntary (often tax-sheltered) contributions that supplement the basic program offered by the employer. Although pension plan income plus social security benefits may account for the bulk of a person's retirement income, we must assume that each employee still has some responsibility for providing supplemental retirement income through voluntary savings

programs. The foregoing evidence would suggest that voluntary programs are in fact essential.

In an age of rapid inflation, the responsibility for voluntary retirement planning becomes more acute, as well as more difficult. The voluntary effort becomes all the more crucial when the basic plans are not able to keep pace with inflation. Table B illustrates the phenomenon in the period of 1976 through 1979 when high inflation rates prevailed, but when TIAA/CREF pension income reported by the respondents remained almost static. Reductions in the CREF annuity value occurred twice during the period. And the single most important reason for these reductions can be found in the investment performance of the pension fund manager.

Investment results are the central determinant of changing pension levels over time in "defined contribution" plans. If investment results do not match the rate of inflation, neither will annuities. In a "defined benefit" plan disappointing investment results do not affect the pension level but the profits or budgets of the former employers. If investment performance is weak, the "defined benefit" will still be paid out, and the former employer must somehow come up with the necessary funds. For "defined contribution" plans, however, investment results better be on target or pensions will stay in a rut or decline.

If a college professor were to retire into the land of investment theory -- in contrast to landing in the real world of retirement -- a plausible answer to the question asked in the title of this essay might well be "yes." The foregoing illustrations, as well as some of what follows, might suggest otherwise.

Sound management of investments during periods of inflation implies among other things that one's investment objective should be to do as well as or better than the prevailing rate of inflation. One of the most widely accepted rules of thumb is that investment total return (capital appreciation plus income from dividends and interest) should be equal to long-term inflation expectations plus three percentage points. This would make the total return objective equal to long-term interest rates for debt of moderate risk at the minimum, and preferably somewhat larger.

Thus, if inflation expectations weigh in at 5 percent per year, the investment objective would have to be at least 8 percent. And when inflation rises to the double-digit 12 percent level, investment total return would have to climb to 15 percent. As we all know, it has been difficult to achieve the high rates of return required by the recently flamboyant rates of inflation.

Ibbotson and Sinquefield have made a masterful analysis of the situation. Their data, brought up-to-date by Zvi Bodie, show that equity investments (common stocks) achieved an annual real rate of return of 10.48 percent between 1953 and 1972 against an average rate of inflation of 2.36 percent per year. Between 1973 and 1978, however, the real rate of return per year drops to minus 4.19 percent for common stocks and the inflation rate rises to 8.10 percent per year.

This performance is mirrored in CREF's investment results. CREF was originally created as a potential vehicle that would protect retired persons against the ravages of inflation. Chart 2 depicts the 1952 through 1980 trends of four key CREF values for a participant who started investing

in CREF in 1952 (semi-logarithmic scale). Tables D and E provide additional insights.

Line 1 of Chart 2 represents the so-called accumulation unit. During a CREF participant's working years, pension plan contributions go toward the purchase of these accumulation units, minus a service charge per contribution similar to a mutual fund's load factor. These units reflect the market value of the CREF investment pool. In 1952, an accumulation unit was worth $10.52; by 1980, the same unit was worth $51.77. This represents an increase of roughly 392 percent overall, or about 14 percent per year.

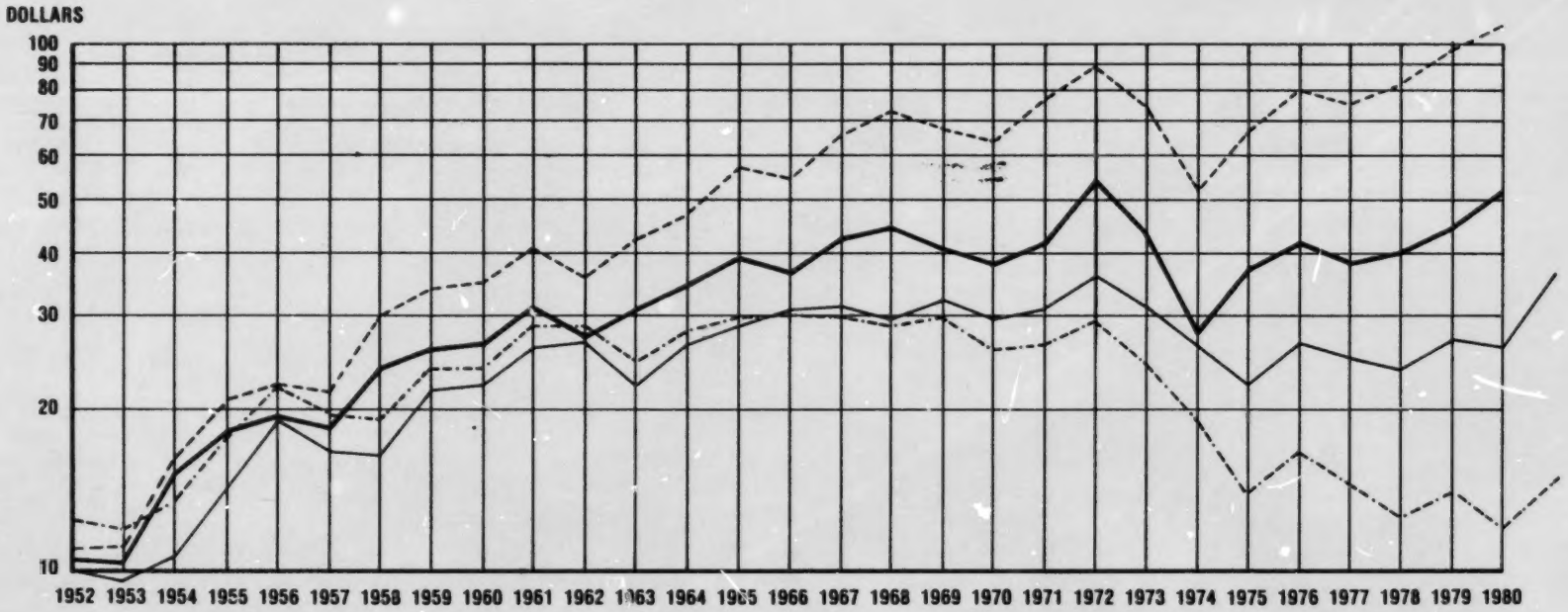
When dividends and interest are added to the accumulation units, the participant benefits from the compounding effect. The reinvested income purchases additional accumulation units. The resulting cumulative unit value is tracked by line 2. Whereas the original cumulative unit was worth $10.63 in 1952, it had grown to $122.09 by 1980. This is an increase of 1,048.5 percent, or a remarkable 37.4 percent per year.

The annuitant is interested in such investment performance to the extent to which and because it affects the value of the annuity unit which is represented by line 3. Starting with a base value of $10.00 in 1952, the annuity unit value had reached $26.27 by 1980. Over the 28-year interval, this gives us a mean annual growth of only 5.8 percent.

Line 4 expresses the annuity unit line in constant 1976 dollars. The average rate of inflation for the entire period came to about 7.5 percent per year. The deflated annuity value stood at $10.63 and was thus worth less in constant dollars in the base year when the inflation adjusted value would have been $12.52.

Chart 2

CREF PERFORMANCE
1952 through 1980



16.

—— **Accumulation unit**

– – – **Cumulative unit with dividends reinvested**

—— **Annuity unit (upon retirement, the number of units remains constant)**

····· **CPI deflated annuity unit value**

(Source: Zvi Bodie, an innovation for stable real retirement income; *The Journal of Portfolio Management*, Fall 1980, p. 8.)

Ideally, information such as that provided in Chart 2 should be calculated for each year into the present and for each individual annuitant. While the trends would be similar actual numbers could be quite different.

The difference between accumulation unit values and cumulative unit values on the one hand and of annuity unit values on the other is striking enough to warrant some comment. We shall touch briefly on key aspects of each of the time series and then proceed to some policy issues.

6. The annuitants described via their pension incomes in our earlier exhibits have generally come to the conclusion that they made a mistake when they elected to join the CREF program. In interviews conducted over a series of years, it becomes clear that their focus is entirely on what happens each year to the value of the annuity unit. Clearly, it has performed poorly.

During the early years of the CREF experience through 1972, the annuity value performed well. As published in the annual reports it had risen to $35.74 its highest level between 1952 and 1980. Between 1952 and 1972, the annuity unit value decreased on seven occasions, all but once by relatively modest amounts.

Since 1972, the annuity unit has been something of a disaster area. Between 1972 and 1980, it decreased in value in three consecutive years at about the time when inflation was moving into double-digit territory. After a one-year increase it continued to decline twice more. In 1979 it increased again, only to fall back in 1980. At this writing, 1981 results are in (the unit's fiscal year is March 31) and the annuity unit is back up at $35.86, slightly above the 1972 previous peak. Even at this level its growth is less than that of the Consumer's Price Index for the 1952-81 period.

Are the annuitants correct when they focus on the changing value of the annuity unit? In terms of their purchasing power concerns, they are most certainly correct. Every decline in the unit value decreases their disposable income and thus their purchasing power. If a retired person needs every penny of retirement income from the first day of retirement -- and given our illustrations, most of the members of our illustrative group do -- any decline in payout will hurt them. Protracted decreases during periods of high inflation can be disastrous. Our investigations of the group's financial requirements would lead us to the conclusion that the CREF annuity unit decreases worked serious economic hardships on more than half of the persons in the group.

Nevertheless, there is another side to the argument. By focusing on the annuity unit value one ignores the fact that through the reinvestment of dividends additional accumulation units were bought. For instance, if one participated in CREF since the beginning through 1980, the compounding must have been substantial. The ratio between cumulative and accumulation unit values is 2.36. In other words, the cumulative unit is worth 2.36 times the accumulation unit. How many "reinvestment" units have been accumulated? Is it 1.36 additional units or more? We do not know, since TIAA/CREF does not tell its participants in the annual "blue-and-yellow" slip.

In a recent article in The Journal For Portfolio Management, Zvi Bodie addresses himself to the issue of investment policy for variable annuity pension plans. Among other things he calculated the constant dollar annuity unit values used in Chart 2 above. After reflecting on this interesting phenomenon of a stagnating annuity value during periods of inflation and the demonstrated growth of the cumulative unit value, we have developed

the "modified constant dollar annuity value" in Chart 3. This is at best an hypothetical indicator of a possible counter-inflationary tendency in the CREF system. At the outset, however, we wish to state categorically that this indicator does not measure the changing purchasing power of the aggregate annuity over time. Annuitants pay their bills with what CREF pays them.

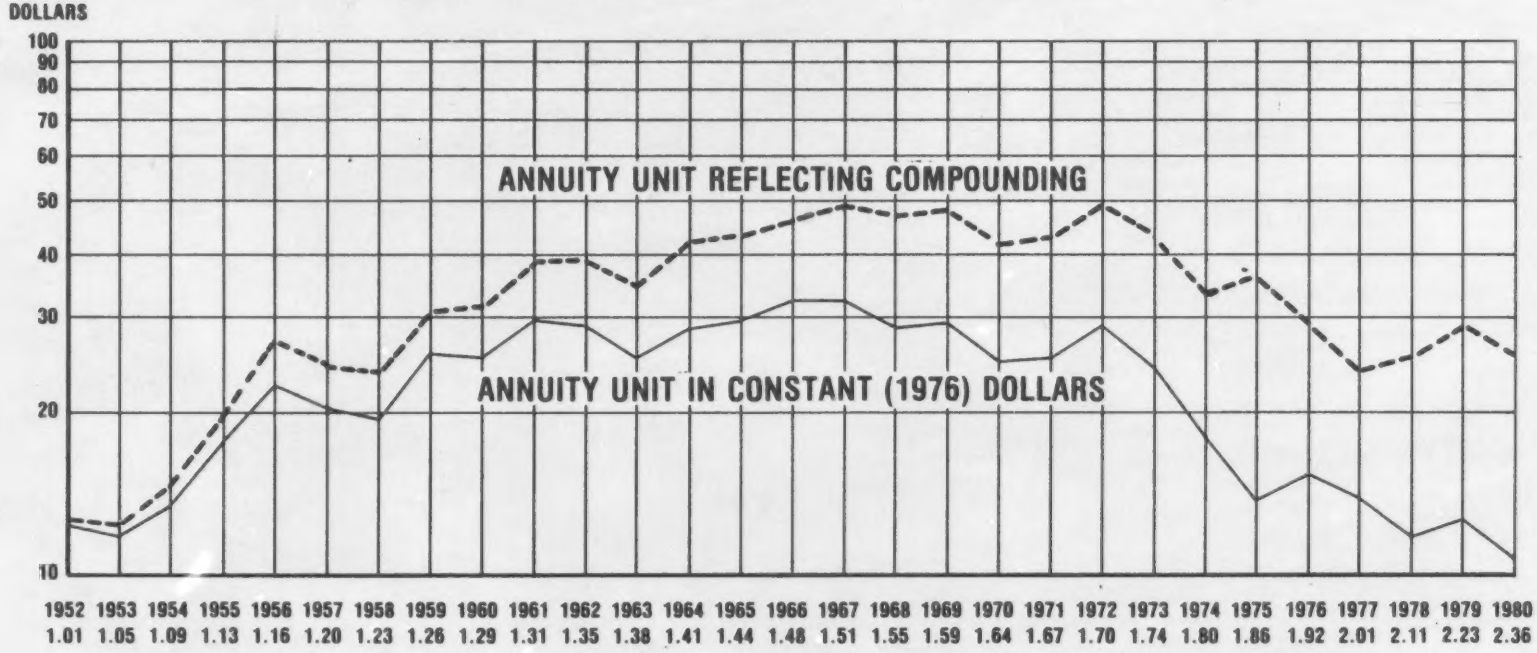
Nevertheless, the "modified" unit value depicted in Chart 3 gives us a perspective of the compounding effect which has been at work throughout the CREF history. The concept is quite simple: we multiplied each deflated annuity unit value by a factor equal to the multiple of the cumulative unit value (with dividends reinvested) divided by the corresponding accumulation unit value. Thus, if the 1952 deflated unit value is $12.52 in 1976 dollars, and if the ratio is 1.01, the "modified" deflated annuity value is $12.65. Or, for 1980, the deflated annuity would be $10.63 multiplied by a factor of 2.36, giving us a "modified" deflated annuity of $25.07.

The resulting graph reveals that the "modified" constant dollar unit value declines less over time than the constant dollar value of the regular annuity. The gap between the two lines, expressing the compounding effect, becomes wider throughout. There still are significant declines in the value of the "modified" unit, but they are less (expressed as a percentage figure) than the decreases that took place in the regular annuity.

For a given annuitant, the relevant factor is the one corresponding to the year of retirement. If the recipient knew how many reinvestment

Chart 3

"MODIFIED" ANNUITY UNIT REFLECTING COMPOUNDING COMPARED TO ANNUITY UNIT IN CONSTANT (1976) DOLLARS



annuities are part of the total annuity package, he or she could make a calculation in order to determine whether or not these reinvestment shares are in fact counteracting the effects of inflation. Such a calculation should be made cumulatively over time, since a point may be reached when the aggregate or cumulative purchasing power loss may not be compensated for by the reinvestment share payout.

We believe that it is not necessary for CREF to receive quite the amount of negative reaction that has been forthcoming from annuitants of late. We recommend that CREF begin as soon as feasible to report to its participants the two crucial numbers: the quantity of accumulation units purchased with each monthly contribution and the number of shares purchased through the reinvestment of dividends.

As any investor in a mutual fund or money market fund knows, such reports are routine, and no investor would tolerate receiving as little information from the fund managers as TIAA/CREF participants accept from theirs. The type of report we have in mind should furthermore indicate at which price the monthly accumulations have occurred, another standard feature in all existing corporate dividend reinvestment plans and mutual funds. The management of TIAA/CREF may argue that it would be very expensive to change its reporting format and detail. Our reply would be that the cost is worth it if at least some of the misunderstanding about CREF can be eliminated. We would also point out that the computer software for the recommended type of reporting is so common and readily available that we see few if any legitimate reasons why this important step in improved communication should not be implemented forthwith.

7. The issue of whether CREF has managed its investments well is much more complex. The answer depends in part on how one should evaluate investment performance. In spite of well-established practices serious questions of methodology arise. Another aspect of the problem is how one fixes in advance the specific investment objectives to be achieved. And for the individual annuitants, the issue is how the general investment results affect the retirement income that finally is being paid out. In this respect it may make a considerable difference when one entered the CREF plan.

In one sense, CREF's biggest investment problem may be its sheer size and the monolythic investment management structure chosen. If one believes in the efficient-market theory of investing, CREF might be expected to do as well as the market most of the time. But what is the market? Is it the S&P 500 stocks? CREF has on the whole kept pace well with this series and at times even surpassed its performance. Should one have tried to match the Wilshire Index? Or is the objective not related to comparative market performance, but as Zvi Bodie argues to the annuitant's purchasing power?

Tables D and E track CREF performance for an annuitant who has been in the system since CREF's inception through 1980. The comparison is in terms of an investment objective attempting to achieve 3 percent real total return after inflation. The growth of the accumulation unit is tracked cumulatively and on a year-to-year basis in Table D. The performance of the cumulative unit is measured in the same manner in Table E. Our 3 percent real total return objective is a tough requirement to meet; the reader can deduct the 3 percentage points in order to compare the lesser objective with the one displayed in Tables D and E.

Table D - Accumulation Unit Performance for Participant Starting Out in 1952 Through 1980

A. Cumulative Performance (1980 Base)

1. Years	1952-80	1953-80	1954-80	1955-80	1956-80	1957-80	1958-80	1959-80	1960-80	1961-80	1962-80	1963-80	1964-80	1965-80
2. No. of years in calculation	28	27	26	25	24	23	22	21	20	19	18	17	16	15
3. Mean (annual) % change	+13.95	+14.78	+ 9.56	+ 7.47	+ 7.07	+ 8.33	+ 5.11	+ 4.33	+ 4.45	+ 3.29	+ 5.24	+ 4.00	+ 3.28	+ 2.16
4. 3% real total return*	-10.52	-10.71	-10.95	-11.31	-11.07	-11.38	-11.91	-11.70	-11.91	-12.23	-12.58	-12.95	-13.35	-13.24
5. Total Return plus or minus objective	+ 3.43	+ 4.07	- 1.39	- 3.84	- 4.40	- 3.05	- 6.30	- 6.37	- 7.46	- 8.94	- 7.34	- 8.95	-10.07	-11.58

1. Years	1966-80	1967-80	1968-80	1969-80	1970-80	1971-80	1972-80	1973-80	1974-80	1975-80	1976-80	1977-80	1978-80	1979-80
2. No. of years in calculation	14	13	12	11	10	9	8	7	6	5	4	3	2	1
3. Mean (annual) % change	+ 3.04	+ 1.40	+ 1.16	+ 2.17	+ 3.21	+ 1.34	- .35	+ 3.07	+ 3.77	+ 8.49	+ 5.34	+11.83	+15.63	+19.86
4. 3% real total return	-13.99	-14.29	-14.40	-14.34	-14.22	-14.50	-15.12	-15.20	-14.18	-13.62	-14.19	-14.99	-16.18	-16.37
5. Total Return plus or minus objective	-10.95	-12.89	-13.22	-12.17	-11.01	-13.16	-15.47	-12.13	-10.41	- 5.13	- 8.85	- 3.16	- .55	+ 3.49

B. Annual Performance (Each Year Is Base)

1. Years	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
2. % change per year	- 1.43	+43.20	+21.62	+ 6.76	- 7.56	+37.24	+11.29	+ 1.00	+16.36	-16.35	+15.68	+10.15	+15.08	+ 7.04
3. 3% real total return	- 3.75	- 3.50	- 2.63	- 4.50	- 6.56	- 5.72	- 3.81	- 4.60	- 4.01	- 4.12	- 4.21	- 4.31	- 4.72	- 5.86
4. Total Return plus or minus objective	- 5.15	+39.70	+18.99	+ 1.46	-14.06	+31.52	+ 7.48	+ 3.60	+12.35	-20.47	-11.47	+ 5.84	+10.36	+ 1.18

1. Years	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
2. % change per year	+20.51	+ 3.59	- 7.87	- 6.20	+17.91	-15.23	-19.95	-33.47	+28.18	+17.39	+10.43	+ 3.22	+ 9.51	+19.87
3. 3% real total return	- 5.88	- 7.20	- 8.37	- 8.92	- 7.30	- 6.30	- 9.23	-13.97	-12.14	- 8.77	- 9.45	-10.60	-14.47	-16.37
4. Total Return plus or minus objective	+14.62	- 3.61	-16.24	-15.12	+10.61	+ 8.93	-29.21	-47.44	+16.04	- 8.62	+ .98	- 7.38	- 4.96	- 3.50

*3% plus rate of inflation

Table E - Cumulative Unit (with income) For Participant Starting Out in 1952 Through 1980

A. Cumulative Performance (1980 Base)

1. Years	1952-80	1953-80	1954-80	1955-80	1956-80	1957-80	1958-80	1959-80	1960-80	1961-80	1962-80	1963-80	1964-80	1965-80
2. No. of years in calculation	28	27	26	25	24	23	22	21	20	19	18	17	16	15
3. Mean (annual) % change	+37.45	+37.78	+25.09	+19.99	+18.65	+20.63	+13.95	+12.25	+12.28	-10.08	+13.35	+11.03	+ 9.70	+ 7.79
4. 3% real total return	-10.52	-10.71	-10.95	-11.31	-11.47	-11.38	-11.41	-11.70	-11.91	-12.23	-12.58	-12.95	-13.35	-13.74
5. Total Return plus or minus objective	+26.93	+27.07	+14.14	+ 8.68	+ 7.18	+ 9.25	+ 2.54	+ .55	+ .37	- 2.15	- 1.23	- 1.92	- 3.65	- 5.95

1. Years	1966-80	1967-80	1968-80	1969-80	1970-81	1971-80	1972-80	1973-80	1974-80	1975-80	1976-80	1977-80	1978-80	1979-80
2. No. of years in calculation	14	13	12	11	10	9	8	7	6	5	4	3	2	1
3. Mean (annual) % change	+ 9.10	+ 6.48	+ 6.13	+ 7.61	+ 8.98	+ 6.43	+ 4.36	+ 9.25	+23.10	+16.14	+12.27	+19.78	+23.32	+26.58
4. 3% real total return	-13.99	-14.29	-14.40	-14.34	-14.22	-14.50	-15.12	-15.20	-14.18	-13.62	-14.19	-14.99	-16.18	-16.37
5. Total Return plus or minus objective	- 4.89	- 7.81	- 8.27	- 6.73	- 5.24	- 8.07	-10.76	- 5.95	+ 8.92	+ 2.52	- 1.92	+ 4.79	+ 7.14	+10.21

B. Annual Performance (Each Year Is Base)

1. Years	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
2. % change per year	+ 2.54	+48.90	+25.45	+ 9.53	- 4.71	+41.22	+13.86	+ 3.37	+18.60	+14.35	+18.34	+12.65	+17.75	+ 4.65
3. 3% real total return	- 3.75	- 3.50	- 2.63	- 4.50	- 6.56	- 5.72	- 3.81	- 4.60	- 4.01	- 4.12	- 4.21	- 4.31	- 4.72	- 5.86
4. Total Return plus or minus objective	- 1.21	+45.40	+22.82	+ 5.03	-11.27	+35.50	+10.05	+ 1.23	+14.59	+10.23	+14.13	+ 8.34	+13.03	- 1.79

1. Years	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
2. % change per year	+23.41	+ 6.13	- 5.52	- 3.22	+20.26	+17.07	-18.15	-30.95	-32.05	+21.19	- 6.44	+ 8.67	+15.84	+26.58
3. 3% real total return	- 5.88	- 7.20	- 8.37	- 8.92	- 7.30	- 6.30	- 9.23	-13.97	-12.14	- 8.77	- 9.45	-10.60	-14.47	-16.37
4. Total Return plus or minus objective	+17.53	- 1.07	-13.89	-12.14	+12.96	+10.77	-27.38	-44.92	-14.91	+12.42	-15.89	- 1.93	+ 1.34	+10.21

In terms of cumulative performance, CREF achieved our investment objective in the following three instances for the accumulation unit alone: (a) from 1952 through 1980, (b) from 1953 through 1980, and (c) in 1980. This is quite remarkable, since our investment objective is for total return and not merely for capital appreciation. For the cumulative unit, our objective was achieved during the following intervals:

(a)	1952-1980	(h)	1974-1980
(b)	1953-1980	(i)	1975-1980
(c)	1954-1980	(j)	1977-1980
(d)	1955-1980	(k)	1978-1980
(e)	1956-1980	(l)	1979-1980
(f)	1957-1980		
(g)	1960-1980		

In all the other intervals, the total return as expressed by the cumulative unit value fell short of our investment objective.

Annually, our investment objective was achieved or surpassed by the accumulation unit value 15 times between 1952 and 1980. In 1980, the real return for the accumulation unit was 6.50 percent, or 3.50 percentage points more than our goal. The cumulative unit value exceeded our objective 17 times. In 1980, it exceeded our objective by 10.21 percentage points. The worst year, as is to be expected, was 1974, when the investment results were minus 47.44 and minus 44.92 percent respectively for the two unit values. In terms of our annual objectives, the two best years were 1953 (+ 39.70 and + 45.40 percent) and 1957 (+ 31.52 and + 35.50 percent).

Table F identifies in section (1) the total investment return performance for the CREF investment pool and compares it to our 3-percent-real-return-plus-inflation investment objective. In the 29 years, our objective was exceeded 15 times. The cumulative results appear to be less

Table F - CREF Total Return (T.R.) Comparisons for Investment Pool with 3% Real Return Plus CPI Investment Objective

A. Cumulative Total Return

1.	Years	1952-80	1953-80	1954-80	1955-80	1956-80	1957-80	1958-80	1959-80	1960-80	1961-80	1962-80	1963-80	1964-80	1965-80
2.	No. years in calculation	28	27	26	25	24	23	22	21	20	19	18	17	16	15
3.	Annual total return	+10.55	+10.85	+ 9.38	+ 8.74	+ 8.71	+ 9.29	+ 7.84	+ 7.55	+ 7.76	+ 7.19	+ 8.39	+ 7.81	+ 7.50	+ 6.82
4.	3% real total return	-10.52	-10.71	-10.95	-11.31	-11.47	-11.38	-11.41	-11.70	-11.91	-12.23	12.58	-12.95	-13.35	-13.74
5.	Total return plus or minus objective	+ .03	+ .14	- 1.57	- 2.57	- 2.76	- 2.09	- 3.57	- 4.15	- 4.15	- 5.04	- 4.19	- 5.14	- 5.85	- 6.92

1.	Years	1966-80	1967-80	1968-80	1969-80	1970-80	1971-80	1972-80	1973-80	1974-80	1975-80	1976-80	1977-80	1978-80	1979-80
2.	No. years in calculation	14	13	12	11	10	9	8	7	6	5	4	3	2	1
3.	Annual total return	+ 7.64	+ 6.42	+ 6.45	+ 7.54	+ 8.61	+ 7.32	+ 6.10	+ 9.56	+16.31	+13.17	+11.17	+17.03	+21.21	+26.59
4.	3% real total return	-13.99	-14.29	-14.40	-14.34	-14.22	-14.50	-15.12	-15.20	-14.18	-13.62	-14.19	-14.99	-16.18	-16.37
5.	Total return plus or minus objective	- 6.35	- 7.87	- 7.95	- 6.80	- 5.61	- 7.18	- 9.02	- 5.64	- 7.87	- .45	- 3.02	+ 2.04	+ 5.02	+10.22

B. Annual

1.	Years	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
2.	Total Return		+ 2.53	+48.83	+25.48	+ 9.49	- 4.71	+41.27	+13.89	+ 3.36	+18.60	-14.36	+18.34	+12.66	+17.75
3.	3% real total return	- 3.75	- 3.50	- 2.63	- 4.50	- 6.56	- 5.72	- 3.81	- 4.60	- 4.01	- 4.12	- 4.21	- 4.31	- 4.72	- 5.86
4.	Total Return plus or minus objective		.97	+46.20	+20.98	+ 2.93	-10.43	+37.46	+ 9.29	- .65	+14.48	-18.57	+14.03	+ 7.94	+11.89

1.	Years	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
2.	Total Return	- 4.66	+23.42	- 6.12	- 5.51	- 3.22	+20.25	+17.07	-18.14	-30.96	+32.06	+21.19	- 6.44	+ 8.68	+15.83	+26.59
3.	3% real total return	- 5.88	- 7.20	- 8.37	- 8.92	- 7.30	- 6.30	- 9.23	-13.97	-12.14	- 8.77	- 9.45	-10.60	-14.47	-16.18	-16.37
4.	Total Return plus or minus objective	-10.54	+16.22	- 2.25	- 3.41	- 4.08	+13.95	+ 7.84	-32.11	-43.10	+23.29	+11.74	- 4.16	- 5.79	- .35	+10.22

impressive: our objective was met or exceeded during five periods only:

1952-1980
1953-1980
1977-1980
1978-1980
1979-1980

The cumulative inflation target was achieved or exceeded during 11 of the 28 periods.

This admittedly superficial analysis leads us to a few conclusions: First, CREF performance, while uneven, is satisfactory when viewed over the entire period. Second, CREF investments have achieved inflation hedging results during up to half of the years since its inception depending upon measurement technique and when one entered the program. Third, the cumulative unit value total return from year to year should outperform our investment objective more often than it has in the past if the annuity value is not to remain depressed for long periods of time.

And herein lies one of the CREF dilemmas. The working participant wants low accumulation unit prices so as to build up a large holding of units; at the same time this participant would benefit from rapid compounding. Chart 2 indicates that for the entire period dollar averaging has benefited the participants. At the other extreme, there is the annuitant who wishes the highest possible annuity unit values. Investment policy and results during periods of very high annual inflation rates seem to have helped the accumulators and punished the annuitants. One therefore wonders whether or not it might be wise to design different investment policies for each.

The Zvi Bodie piece provides an alternative for the investment of the money pool composed of the capital represented by the annuitants. If

Bodie's investment results can in fact be achieved in the future for annuitants with their capital, there will indeed have been accomplished the ideal result for them: annuities proper will have been hedged as much as is possible against inflation. At the same time, the existing policy for investing the capital of working participants will have provided them with the opportunity to build up capital toward annuity payout as rapidly as possible.

Since the long-range investment results have been satisfactory, as we have shown, there is no reason why CREF management and trustees should not immediately address themselves to the problem of how to make annuities less vulnerable to inflationary erosion. If the annuitants present and future knew that this was an active concern within the organization and that there existed a will to bring about changes in approach and policy as expeditiously as possible, the gratitude would be widespread. And so would the benefits to annuitants in the real world of high inflation.

8. At the outset, we asked the question: "Can Anyone Afford To Retire in an Age of Inflation?" Some of our evidence suggests that for many individuals the answer is "no." On the other hand, there is evidence that under certain circumstances the answer could be "yes."

We commend to analysts and pension fund managers the thesis advanced by Zvi Bodie in the article cited above. There exist investment vehicles which can over long periods of time, as well as in the short run provide annuitants with anti-inflationary protection. The Bodie investment mix is worth studying.

We also believe that some of the negative reactions now abroad among CREF annuitants are not necessarily appropriate. Because CREF does not

provide a clear enough set of numbers to annuitants, the latter tend to overlook how many more annuity units they have been able to accumulate over time as a result of CREF's investment performance from the reinvestment of dividends. Some of the anti-inflationary protection for annuitants arises from this reinvestment accumulation of future annuity units.

Bodie's focus on an investment strategy designed to protect annuitants from inflationary purchasing power erosion leads to a further important distinction: there may well exist a need to have a distinct investment policy or program during the accumulation phase and a different one during the annuity payout phase. Quite possibly, CREF annuitants might have accumulated fewer units under the Bodie plan. The objective must be to accumulate the maximum number of units during the accumulation phase and then to stabilize the payout and make it grow in relation to the rate of inflation. We believe that it is imperative for the CREF trustees and management to face up publicly to this dilemma.

A final point is worth making: we have not analyzed whether TIAA would have been a better hedge against inflation during the accumulation phase than CREF. Updated studies simulating alternative rates of participation in the TIAA and the CREF programs would shed some much needed light on comparative performance and would be of immense help to current participants when they ask themselves how best to assign their premiums. Such studies also would help clarify debates now taking place among annuitants who wonder whether or not they made the best choice when they opted for their particular allocation of funds now producing results such as those illustrated earlier in this essay.

In the long run, we believe that there exist no pension plan combinations which can adequately protect annuitants from protracted double-digit inflation that would not at the same time bankrupt those who are called upon to finance them. It is essential that double-digit inflation -- significant inflation, generally -- be fought by means of a strong economic policy designed specifically to avert it. The prospects for this to happen are not very promising in spite of what we see happening in Washington, D.C. these days. To the extent to which inflation cannot be averted, when it reaches the proportions we have recently seen, annuitants will continue to suffer purchasing power losses. Under the CREF program, given greater flexibility in the future, some appropriate steps could be taken to minimize such losses without jeopardizing the essence of the CREF philosophy. Without some immediate adaptation, opposition to CREF may well mount and spread, and this is something that we all should try to prevent from happening.

HHJ.gb
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Acknowledgements and Sources

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The illustration for the 1952-1980 changes in unit values for one annuitant are taken from TIAA/CREF 1980 Annual Report, Part A.

Other sources used:

(1) Bodie, Zvi: An Innovation for Stable Retirement Income; The Journal For Portfolio Management; Fall 1980, New York, pp. 5-13.

(2) Survey of Current Business, Current Business Statistics, January 1981.

(3) Joseph Minarik, et al: Necessities Inflation Once Again; Challenge The Magazine of Economic Affairs, January/February 1981, pp. 44-52.

(4) Average salary data taken from TIAA/CREF interoffice Memorandum, Reconsideration of Standard Salary Scale Assumptions; based on data taken from Sidney G. Tickton, AAUP, and NEA reports.